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to apply these distinctions, and it seems difficult to render them of any great systematic value. Leighton, who has described and figured the spermatia of a large number of lichens, has failed in many instances to recognize the differences in form indicated by Nylander, especially in regard to the first two forms, and points out a great confusion in the application of Nylander's idea in his *Prodromus* and *Synopsis* in regard to the spermatia of *Platysma* (*Cetraria*). In figure 150 (*a*, spermatia of *Pyrenula lactea* Mass.; *b*, *Verrucaria epigæa* Pers.; *c*, *Synalissa phylliscina*; *d*, *S. phæococca* Tuck.; *e*, *Lecanora athrocarpa* Duby; *f*, *Parmelia colpodes* Tuck.; *g*, *Cetraria ciliaris* Ach.; *h*, *Placodium camptidium* Tuck.), we give a few additional illustrations of the different forms of spermatia. A slight but distinct crackle is almost invariably heard on crushing the spermogonia under the thin glass, which seems peculiar to these organs. Besides the spermogonia, there are also other small bodies, resembling them in external appearance, called pycnides (Fig. 151), but containing spore-like bodies called stylospores (Fig. 152), on the extremities of short filaments. They are often septate. Their office is unknown, and they are of comparatively infrequent occurrence.

REVIEWS.

THE EARED SEALS.*—Up to the year 1866, comparatively little attention had been paid to the systematic relations *inter se* of the seals, and in that year, Dr. John Edward Gray, in the "Catalogue of the Seals and Whales in the British Museum," adopted essentially the same classifica-

*On the Eared Seals (*Otariadæ*), with detailed descriptions of the North Pacific species, by J. A. Allen. Together with an account of the habits of the northern fur seal (*Callorhinus ursinus*), by Charles Bryant. [1 pl. 108 pp., 3 pl. 3l. exp.] Bulletin of the Museum of Comparative Zoology [etc.]. Vol. II. No. 1.

The copy which we owe to the kindness of the author, is further illustrated by two photographic plates of *Zalophus Gillepsii*.

tion which he had presented in 1850, in his catalogue of the seals—a singularly unnatural one, based chiefly on the number and development of the teeth; all the Pinnipeds were regarded as forming a single family, divided among five sub-families, namely:—

A. Grinders two-rooted; [etc.] *

a. cutting teeth 4 [above]; 4 [below] [etc.] *Stenorhynchina*.

b. “ “ 6 [above]; 4 [below] [etc.] *Phocina*.

B. Grinders with single root (except the two hinder grinders of *Halichærus*).

c. Ears without any conch; [etc.].

* Muzzle large, truncated, simple; canines large; grinders lobed, when old, truncated. *Trichechina* (with *Trichecus Rosmarus* and *Halichærus*!)

** Muzzle of the male with a dilatable appendage; cutting teeth 4 [above] 2 [below]; [etc.] *Cystophorina*.

d. Ears with a subcylindrical distinct external conch; [etc.] *Arctocephalina*.

*Only the prime contrasted characters are noticed here; the others are often applicable only to a portion of the groups diagnosed.

If classification is really intended to represent the natural relations of organized beings, as determined by the sum of their structural agreements, and the subordination of the respective groups differentiated, a more unfortunate classification than that noticed could scarcely be devised; if even it is only regarded as a means to enable us to ascertain the name of a certain form, it is a decided failure; *i. e.* *Halichærus* (of the second prime division), having the “grinders with single root (*except the two hinder*),” not being distinguished, even by Gray’s own diagnosis, from *Lobodon* of the *Stenorhynchina* (first prime division), which has only “the first, second, and third front upper grinders single-rooted, [the rest *two hinder*] two-rooted!” Like inconsistencies prevail, but why, in the name of science and common sense may we ask, is *Halichærus* separated from those forms which it so much resembles, to be combined with the Walrus, to which it is so very unlike, when even a diagnosis has to be explained away to admit of such a freak! The chief modifications in the arrangement of 1866, compared with that of 1850, are the introduction of the genera *Pagomys*, *Halicyon*, (the latter based on intangible characters,) and *Callorhinus*.

In the same year, 1866, appeared a “Prodrôme of a Monograph of the Pinnipeds, by Theodore Gill,” in the Proceedings of the Essex Institute (V, pp. 1-13), in which those animals were distributed among three families (*Phocidæ*, *Otariidæ*, and *Rosmaridæ*), equivalent to the three sub-families recognized by Turner, and the *Phocidæ* were divided into three sub-families, distinguished by important osteological characteristics previously unnoticed by systematists. In the *Otariidæ*, five genera were recognized, of which the types were the only species mentioned.

This article was rapidly succeeded by a number of memoirs, chiefly on the Otariids, two by Gray and two by Peters being published in the same year. The former, after a first passionate outburst of anger, finally accepted as valid the three families just noted, and, like Peters, adopted the genera of Otariids first defined in the Prodrôme (*i. e.* *Eumetopias* and

Zalophus), raised to generic rank two additional groups named as sub-genera by Peters, and ended by proposing genera for every recognized species of the family, and distributing them among five sub-families. The extreme to which differentiation was carried may be judged from the fact that Mr. Allen has reduced two of his genera to one species, and was strongly inclined to reduce three others to a second species. Those sub-families in the main agreed with the genera defined in the "Prodrome of the Pinnipeds," but were rendered unnatural by the combination—in face of the characters used as diagnostic—of *Arctophoca* (a sub-division of *Arctocephalus*) with *Eumetopias*, and by the association of *Phocarcos* (a form inseparable from *Otaria*) in the "*Arctocephalina*." As an example of the mode of differentiation, the following diagnoses will suffice.

"*Zalophus*. Grinders large and thick, in a close uniform series. South America."

"*Nerphoca*. Grinders large, thick, all equal, in a continuous uniform series. Australia."

As will be perceived, the same feature is indicated simply by a slightly different phraseology, save as to the locality. But even the alleged character of locality is erroneous, for *Zalophus* has never been found in South America, and its type is an inhabitant of the North Pacific only, i. e. California and Japan!

The chief and most valuable information published after the "Prodrome," and up to the year 1870, was contributed by Dr. Wilhelm Peters, and to that accomplished zoologist we are indebted for the first reliable coördination of external and osteological characters—a task that was found to be impossible with the material possessed by the author of the "Prodrome."

Much information had also accumulated as to the distribution, habits, and external characteristics of the various species of *Otariidæ*, and excellent figures of the skulls of several species had been published. It was with these additional facilities that Mr. J. A. Allen proceeded to the investigation of the North Pacific species of the family, and incidentally of the classification of the entire group. He has, like his immediate predecessors, admitted the validity of the family called by him "*Otariadæ*," and has admirably contrasted the characteristics of the pelvis and hind limbs of those animals, with the corresponding parts of the Phocids; the species of Otariids are distributed among five genera corresponding to those established in the "Prodrome," and of which our author remarks that "these appear to be natural groups, of true generic rank, and properly restricted; and, after a careful examination of the subject, . . . they appear to [him] to include all the natural genera of the family."*

These five genera are considered by Mr. Allen as separable among two sub-families, the author remarking (p. 22) "that if the *Otariadæ* constitute a group entitled to family rank,—and the so-called sub-families of the

* Allen, op. cit., p. 38.

Phocidæ have truly a sub-family value, — the *Otariadæ* must be considered as divisible into two sub-family groups, of which the hair seals constitute one and the fur seals the other." Reviewing the previous sub-divisions into tribes or sub-families by Gray, and the misappropriation of sub-family names derived from the typical genera, he adds that in view of this confusion the name *Trichophocinæ** is proposed for the hair seals, and *Oulophocinæ*† for the fur seals, in allusion to the different character of the pelage in the two groups." To the *Trichophocinæ*, are referred the genera *Otaria*, *Eumetopias*, and *Zalophus*; to the *Oulophocinæ*, the genera *Arctocephalus* and *Callorhinus*.

Mr. Allen has derived the characters for his sub-families, solely from the nature of the pelage, the size and form of the entire animal, the length of the ears, the length of the toe-flaps of the hinder limbs, and the number of molars. His definitions are as follows:—

"Sub-family I. *Trichophocinæ*.

Without under-fur; size large and form robust; ears short and broad; molars either 6 [above] 5 [below] 5 [above] 5 [below]=12 [above] 10 [below] or 5 [above] 5 [below]=10 [above] 10 [below]."

"Sub-family II. *Oulophocinæ*.

With thick under-fur; size smaller; form more slender, and the ears and the toe-flaps of the hinder limbs much longer than in *Trichophocinæ*; molars 6 [above] 5 [below] 6 [above] 5 [below]=12 [above] 10 [below]." (Allen l. c., 44.)

We may at once concede the applicability of the distinctions based on the pelage, remarking, however, that the character is not as absolute as might be inferred from the expressions used, for in the hair seals there is the homologue of the under-fur of the fur-seals, and Gray attributes to *Zalophus cinereus*, "young covered with soft fur, which falls off when the next coat of fur [hair] is developed." Peters also found a considerable difference in the extent of the under fur in the species of *Arctocephalus*, *A. antarctica* (*Otaria pusilla* Peters) having very thin under hair ("Mit sehr sparsamer Unterwolle"); *A. cinerea*, thicker under-hair ("Mit reichlicherer Unterwolle"), and *A. Falklandica* also thick under-hair ("Haar mit dichter Unterwolle"); the difference between the extremes of those two groups seems thus to be very much reduced, when we take all into consideration.

As to size, the difference seems to be more than reduced to a minimum, and to be degraded to absolute nullity. The length of the skull is the most constant meter, and the following measurements, to all of which Mr. Allen had access, will demonstrate the truth of our criticism. We have in every case taken the measurement of the adult males only, and have reduced all the measurements to millimetres.

1. <i>Arctocephalus nigrescens</i> ,	203	Gray.
2. " <i>Falklandicus</i> ,	235	Peters.
3. <i>Callorhinus ursinus</i> ,	237	Gray.

* *τριζ*, hair, and *φώκη*, seal.

† *ὄυλος*, soft, and *φώκη*.

4.	<i>Otaria Ulloa</i> ,	238	Peters.
5.	<i>Callorhinus ursinus</i> ,	245	Allen.
6.	<i>Arctocephalus antarcticus</i> ,	262	Gray.
7.	<i>Zalophus Gillespii</i> (<i>Japonica</i>),	270	Peters.
8.	<i>Callorhinus ursinus</i> ,	275	Allen.
9.	<i>Zalophus Gillespii</i> ,	279	Gray.
10.	" "	290	Allen.
11.	<i>Otaria Godeffroyi</i> ,	300	Peters.
12.	<i>Zalophus Gillespii</i> (<i>Japonica</i>),	310	Peters.
13.	" "	330	Allen.
14.	<i>Otaria jubata</i> ,	335	Gray.
15.	<i>Eumetopias Stelleri</i> ,	355	Gray.
16.	" "	374	Allen.
17.	" "	385	Allen.

As it may be objected that the skull of *Otaria Ulloa* was of a female or young, we will at once dismiss that from consideration. But the forms still remaining, and concerning which no objection, it appears to us, can be urged, demonstrate that there is not only no constant difference, but that members of the respective groups traverse the limits assigned thereto, some individuals of *Oulophocinae* being larger than some individuals of the *Trichophocinae*, *Zalophus* being admitted as one of the latter. It is further to be added that the "form more slender" of the former, implies a greater relative total length for those animals than the head alone would indicate, and thus the inapplicability of the diagnosis is still further enhanced.

As to the character derived from the comparative robustness or slenderness, the following measurements by Mr. Allen, of the hair and fur seals of Alaska, show the following proportions: *—

	Unmounted.	Mounted	Skull.	Ratio of skull to length of male skin.
<i>Callorhinus ursinus</i> (2,923),		2,470	245	I.-X. 20-245
" " (2,922),	2,311	2,390	275	I.-VIII. 190-275
<i>Eumetopias Stelleri</i> (2,920),	2,750	2,790	374	I.-VII. 300-374
" " (2,921),	2,896	3,010	385	I.-VII. 315-385

When we thus become cognizant of the comparatively slight differences between the two members of the family observed, when too, we notice the range of variations in one of the species, and when we reflect that such difference may be created by the mode of preparation of skins, and that other forms appear to be intermediate, to say the least, the character becomes very intangible.

The length of the ears is the next character noticed; the following measurements will illustrate the relative lengths in millimetres.

<i>Otaria</i> , 15-20	Peters.	<i>Eumetopias</i> , 35-37	Allen.
<i>Zalophus</i> , 15-20?	Peters.	<i>Arctocephalus</i> , 30-40	Peters.
<i>Eumetopias</i> , 30	Peters.	<i>Callorhinus</i> , 35-50	Allen.

These measurements, by Mr. Allen, are from the *same individuals*, before

* No data are given concerning the ratio of the girth to the length, and no very appreciable and constant differences appear to exist, although there is said to be considerable difference in such respects in the same individual at different seasons.

and after mounting, the ears appearing shorter when mounted. We thus learn at once to distrust and be cautious respecting such characters, even admitting their value. But in view of these tables, and the conclusions we have already reached concerning the size, we are compelled to ask, where are the differences—even proportionate? Be it remembered that no differences of form have been referred to, nor has the reviewer by autopsy been able to convince himself of the existence of any of moment.

One other character remains; in *Oulophocinæ* “the toe-flaps of the hinder limbs much longer than in *Trichophocinæ*.” The statement is perfectly applicable, whatever may be our estimate of its value, if only *Calorhinus* and *Eumetopias* are taken into consideration, but *Otaria* itself offers an intermediate condition. There is no difference claimed as to dentition, as the alternatives for the *Trichophocinæ* indicate.

Mr. Allen, we trust, will pardon us, in view of the facts now made prominent, if we refuse to consider the alleged differences as indicative of sub-family value, if only for the reason that they are not trenchant; but we must add that even had they been absolute, we should have been extremely doubtful as to the propriety of assigning them such a taxonomic value.

But if we have been obliged—and most unwillingly we have—to dissent from Mr. Allen in his view of taxonomic values, we rejoice to testify to our concurrence with him in the main, and if Mr. Allen will simply reject *Zalophus* from the company of the other hair seals, we will at once admit that he has made an important advance in the appreciation of the relations, *inter se*, of the members of the family; the comparative relation between *Otaria* and *Eumetopias* appears indeed to be more intimate than previous observers had suspected, and equally intimate as contrasted with those just named is the relationship between the genera of the fur seals. But between both forms and *Zalophus*, the hiatus appears to be almost equally wide and impassable, although perhaps less between it and the typical hair seals. If any prime sub-division of the Otariids is to be made, and if the skull is a correct index, it should, in our judgment, be made into one group, composed of all its members save *Zalophus*, while that group should be isolated afar. All the species, except of that genus, agree in having a more or less decurved and swollen muzzle, and a deep sagittal seam, or groove, between the low ridges indicating the limits of the muscular attachments. *Zalophus*, on the contrary, has a narrow and regularly attenuated muzzle, which is straight or even slightly concave, and instead of a sagittal seam has a much elevated and trenchant crest; these characters are supported by peculiarities of the post-orbital lobes, the nasal channel, the sinus of the bony palate, the pterygoid hamuli, and the dentition. *Zalophus*, as Mr. Allen has well remarked, “so far as the skull is concerned, is the most distinct generic form of the *Otariadæ*, it being thoroughly distinct from all the others” (p. 68). We may add that we know of no indications, from other sources, which belie

this evidence of isolation. But while we would thus insist on the isolation of *Zalophus*, we would not consider it as entitled to rank other than as an aberrant genus (*i. e.* in comparison with the more numerous existing forms) of a homogeneous family. Far different, in our opinion, are the relations between the members of that family and the groups which have been distinguished as sub-families in the Phocids,* and which we are happy to learn meet with Mr. Allen's approbation.

Availing ourselves now of the data that have accumulated up to the present time, and which have been so well digested by Mr. Allen, we believe that the relations of the Otariids may be expressed by the following synoptical table, in which only the most obvious and distinctive characters are introduced.

- | | |
|---|-----------------------|
| I. Skull with a more or less decurved front rostral profile, and with a sagittal groove from which are reflected the low ridges indicating the limits of the temporal muscles. | |
| A. Pelage with under-fur; molars normally 6 [above] 5 [below] 6 [above] 5 [below]; hinder feet with swimming membranes produced much beyond the toes, and moderately incised. | |
| a. Snout much decurved above, and abbreviated, its length being less than the longitudinal diameter of the orbits, | <i>Callorhinus.</i> |
| b. Snout moderately declining above, and moderate in length, exceeding the longitudinal diameter of the orbit, . . . | <i>Arctocephalus.</i> |
| B. Pelage without defined under-fur. | |
| a. Molars above 6-6; the last little remote from the preceding and in a line with, or in advance of the transverse maxillo-palatine suture; bony palatal margin much nearer the pterygoid hamuli than the teeth; hinder feet with swimming membrane much produced and deeply incised, . . . | <i>Otaria.</i> |
| b. Molars above 5-5; the last remote from the preceding, and behind the transverse maxillo-palatine suture; bony palatal margin nearer to teeth than to pterygoid hamuli; hinder feet with swimming membrane produced little beyond the toes and moderately incised, . . . | <i>Eumetopias.</i> |
| II. Skull with a straight or incurved fronto rostral profile, and with a solid, thin, and much elevated sagittal crest, . . . | <i>Zalophus.</i> |

Although we are not inclined to place much stress on the sequence of forms when so many gaps remain unfilled, and when the unknown might reverse the opinion that we have with more or less reason derived from some acquaintance with the seen, we are disposed to believe that the preceding approximates correctness, and to believe that *Zalophus* is the most generalized form, *Eumetopias* next, and *Callorhinus* the most specialized. If it were absolutely necessary to express the various categories of subordination by names, we would have to designate I. and II. as contrasted, and then I. (A). and I. (B). as representing a nearer degree of relationship, but such a system, especially when the genera are very numerous, becomes too complicated, and is of really little or no use. We

*These sub-families, though bearing the same name as Dr. Gray imposed on artificial groups, are entirely differently limited.

do not speak of taxes on the memory, for memory has nothing to do with the existence of natural groups, although some persons are in the habit of objecting to names because, forsooth, they tax the memory.

With respect to species, Mr. Allen carries conservatism to an extreme. In the case of doubtful species—at least of those which have tangible characters, but the value of which may be dubious—some naturalists refer such at once to species which they appear, in their judgment, to most resemble, while others—probably most—retain them with reserve, awaiting future information. Of the former school Mr. Allen is an ardent disciple, and finding a certain range of variation in some known form, he concludes that analogous variations are only of like value; the inference is by no means a perfectly safe one, though it may be best in *proposing* specific names, to be somewhat influenced thereby. In the present family, at least ten species have been admitted by one of the most accomplished and judicious naturalists (Professor Peters) of Europe, after autopsy. Three such species are considered by Mr. Allen, who had never seen them and was only guided by analogy, as variations of one; *Otaria jubata*, *O. Ulloæ*, and *O. (Phocarcos) Hookeri*,* being referred to *O. jubata* extended; and three other species unhesitatingly admitted by those who have examined them, are admitted as very doubtful, *i. e.*, *Arctocephalus Falklandicus*, *A. cinereus* (Gray), and *A. antarcticus*. It may be that Mr. Allen is correct; there are doubtless reasons for his belief, but, in our judgment, the interests of science are better subserved by retaining the doubtful forms as distinct, till observation has demonstrated their character; by retaining them as distinct, an incitement is furnished to their collection and investigation, while if they are merged as synonymous with others, their identity is lost; it is assumed that their degradation was correct, and if finally proved to be distinct, it has too often happened that they have been re-introduced into the system under new names, the recollection of their former distinction having been lost, and thence it is that in after years the nomenclature is again disturbed by the revival of the unjustly buried names. It is to be feared that some of the species which Mr. Allen has doomed to annihilation will yet arise and assume a healthy stability.

A few words as to the relations of the family. Mr. Allen, treating of the primary groups of the Pinnipeds, remarks (p. 21), that “believing that they have a higher value than a sub-family value, I adopt for the present the classification elaborated by Dr. Gill, in his Prodrôme, which is, it seems to me, the most natural arrangement of the Pinnipeds that has been proposed. Gill’s arrangement places the *Otariadæ* between the *Phocidæ* and *Rosmaridæ*.* The *Otariadæ* are evidently the highest, though they seem intermediate in general features between the earless seals and

* Since the transmission to the printer of the copy of this review, a number of the “Anales del Museo publico de Buenos Aires” has come to hand in which the discovery of the *O. Hookeri* at the mouth of the Rio Parana (op. cit. I. 461) is announced.

the walruses. Their affinities, as they appear to me, may be indicated as follows:—

OTARIADÆ,

“*ROSMARIDÆ*,

PHOCIDÆ.

“The evidences of the superiority of the *Otariadæ* over the *Phocidæ*, consist mainly in that modification of their general structure, and especially of the pelvis and posterior extremities, by means of which they have freer use of their limbs, and are able to move on land with considerable rapidity; the *Phocidæ*, on the other hand, move with great difficulty when out of the water. But the higher rank of the former is also indicated by their semi-terrestrial habits, the scrotal position of the testes, and in the nearer approach in general features to the terrestrial Carnivores, especially in the more posterior position of the acetabula. Most of these modifications are, however, nearly equally shared by the *Rosmaridæ*, indicating, likewise, that their true position is above that of the majority of the *Phocidæ*.”

Like considerations of structure induced the author of the “*Prodrome*” to adopt the arrangement commended, but without reference to that metaphysical rank to which Mr. Allen seems to refer. High and low in zoology are often very ambiguous terms. So far as Mr. Allen means the generalized, by high, and by lower, the more modified types, we perfectly agree with him, for the Otariids seem indubitably to be the least removed in structure from that stock which has diverged from the old feral stem and culminated into the existing Pennipeds; nearly equally plain does the evidence appear that the Walrus is in general a type which possesses more of the primitive characters of the stock than do the Phocids, although it exhibits some remarkable teleological adaptations. But such a connection of the term high would indicate a belief in progressive degradation—a Hibernicism which we are probably not the first to use. Even in this sense, as an abstract question, we have no objection to the employment of the term low, for there seem to be too many proofs of the existence of such cases to doubt. But Mr. Allen leaves us in uncertainty as to whether he shares with the few scientists a belief in metaphysical species and subordination, or, with the many, interprets appearances as indicative of facts. In the former case there would be no basis for argument, but if we still call low, in comparison with the gressorial carnivores, the Pinnipeds and the whales, believing in their evolution from the same stock as the former, it is only because we connect, with adaptation for aquatic life, the idea of degradation. How far this may be correct, we are not at present called upon to discuss. It may be here stated that if the author of the “*Prodrome*,” in a treatise on the Pinnipeds alone, placed the Otariids in the middle, because they were the most generalized, and the other types departed therefrom in different directions, he would not feel barred, in a general scheme of the mammals, from placing them, for the same reason, next to the still more generalized group

In this connection it may be recalled that while in the monogamous Pinnipeds, or those living in small communities, there is little difference in size between the males and females, in the social species, or rather those of which the males have harems, the males are vastly larger than the females. *Macrorhinus*, of the Phocids, and all the Otariids belong to the latter category. The difference between the sexes would be readily explained by Mr. Darwin on the principle of natural selection. It is evident that the larger and more vigorous males would be the eventual possessors of the females, and the disproportion of the sexes would in lapse of time culminate, till it had reached a proportion when obvious mechanical difficulties would more than balance the advantages resulting from superior size and vigor, and when, therefore, farther disproportion would be arrested. It may be added that the like disproportion of the sexes in the forms above enumerated, furnishes not the slightest evidence of more intimate primordial affinity, for like causes would in each special case, such as this, produce like effects.

We have already lingered so long over the systematic portion of Mr. Allen's work that we are perforce obliged to omit any observations on the habits or physiological relations of the species, but the work is replete with information on the subject contributed by Captain Bryant respecting the fur-seal (*Callorhinus ursinus*), and judiciously edited, with notes and comparisons with the habits of other members of the family, by Mr. Allen.

And finally, cordially thanking Mr. Allen for his most valuable contribution, and the Museum of Comparative Zoology, under Professor Agassiz's superintendence, for its publication, we close by a recapitulation of its most noteworthy elements, namely:—A nearly complete résumé of the later literature on the subject, and discussion of the value of the respective contributions, enabling him who would follow up the investigation to refer at once to the proper authorities; an excellent contrast of the skeletal characters of the Otariids and Phocids; a coördination of external and internal characters for the genera, and the approximation of the related genera; detailed descriptions and measurements of the Alaskan species; and, finally, in company with Captain Bryant, copious information respecting their habits, and comparison thereof with those of other species. —THEODORE GILL.

INJURIOUS INSECTS.*—In this contribution to applied entomology, we find new observations relating to insects injuring the apple-tree, cherry, cranberry vine, currant, raspberry, oak, pine, certain ornamental shrubs, garden vegetables and hot-house plants. The apple-bud moth (*Grapholitha oculina*), so injurious in Eastern New England, is described. The larva is a little brown caterpillar which eats the buds in May. It is difficult to kill it without also injuring the tree itself. It also injures the buds

* Injurious Insects, New and Little Known. By A. S. Packard, jr., M. D. [From the Massachusetts Agricultural Report, 1870.] 8vo, pp. 31. With a plate and wood-cuts.